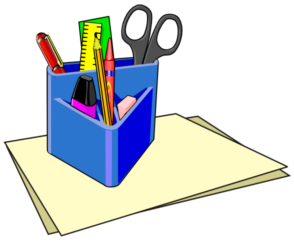
Activity 17



OBJECTIVE

To construct a 3 × 3 Magic Square of Magic Constant 15

MATERIALS REQUIRED

White paper, sketch pen/pencil, ruler

METHOD OF CONSTRUCTION

1. Take a white paper and draw a 3 × 3 square grid on it as shown in Fig. 1.

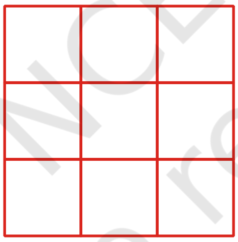


Fig. 1

2. Draw four squares outside the middle square of each side of the grid as shown in Fig. 2.

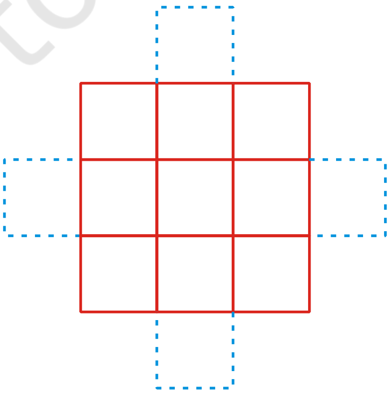


Fig. 2

13/04/18

3. Put the numbers 1 to 9 as shown in Fig. 3.

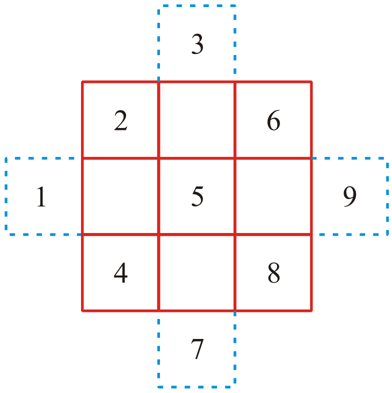


Fig. 3

4. Now write the numbers written outside as shown by arrows in Fig. 4.

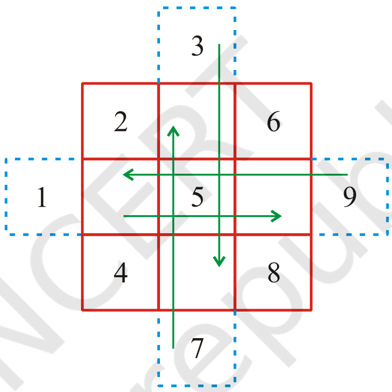


Fig. 4

Now erase the squares outside and obtain a square as in Fig.5.

2	7	6
9	5	1
4	3	8

Fig. 5

Demonstration

Fig.5 gives a magic square formed by the numbers 1 to 9 in which the sum of numbers in each row, each column and each diagonal is 15 (called magic constant).

Observation

Complete the following table:

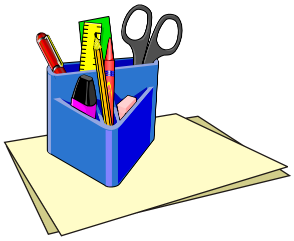
	Numbers			Sum	Magic Constant
Row 1					
Row 2					
Row 3					
Column 1					
Column 2					
Column 3					
Diagonal 1					
Diagonal 2					

Application

1. This activity can be used to construct a 3 × 3 magic square of any magic constant like 18, 21, 24 etc., using different nine consecutive natural numbers.

2. This activity can also be used to construct a 5 × 5 magic square.

Activity 18



Objective

To construct a 3 × 3 Magic Square of Magic Constant 15

Materials Required

Chart paper, coloured paper, sketch pen, scissors, ruler.

Method of Construction

1. Take a square chart paper of size 12 cm × 12 cm.
2. Make a 3 × 3 grid on the chart paper.

Demonstration

1. Put the number 5 (=15 ÷ 3), called central number in the middle square.

2. Add 2 to the central number and subtract 2 from the central number and put these numbers to the right and left of the central number, respectively along the central row (Fig. 1).

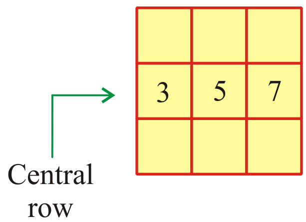


Fig. 1

3. Add 1 to the central number and subtract 1 from the central number and put these numbers upward and downward, respectively along the right diagonal (Fig. 2).

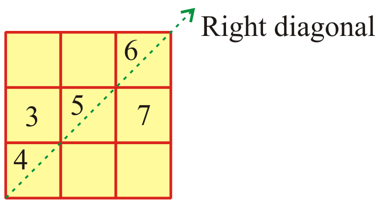


Fig. 2

4. Add 3 to central number and subtract 3 from the central number and put these numbers upward and downward, respectively along the left diagonal (Fig. 3).

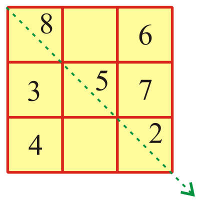


Fig. 3

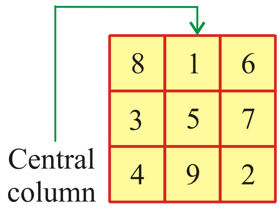


Fig. 4

5. Subtract 4 from the central number and add 4 to the central number and write these numbers upward and downward, respectively along the central column (Fig. 4).

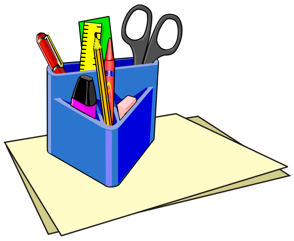
Observation

	Numbers			Sum	Magic Constant
Row 1	8	1	6	15	
Row 2					
Row 3					
Diagonal 1	8	5	2	15	
Diagonal 2					
Column 1	8	3	4	15	
Column 2					
Column 3					

Application

1. This method can be used to construct 3 × 3 magic square of some other magic constants (multiple of 3).
2. Instead of numbers from 1 to 9, any nine consecutive natural numbers can be taken.

Activity 19



Objective

To find multiples and factors

Material Required

A white chart paper, ruler, pencil, sketch pens of different colours.

Method of Construction

1. Take a white chart paper and draw a grid of 10 × 10.
2. Write numbers from 1 to 10 on the rows and columns (Fig. 1). (Mark numbers 1 to 10 over the rows and columns)

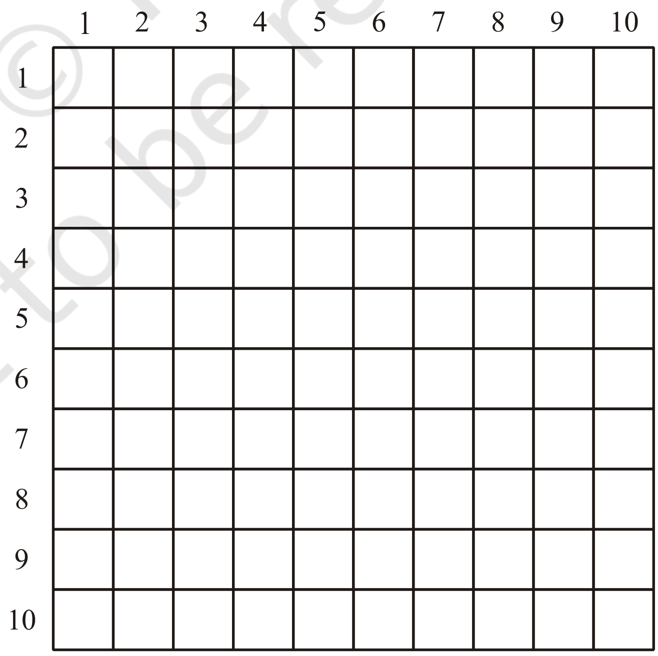


Fig. 1

3. Colour with pink the boxes of Column 1.

4. Colour with yellow every alternate box of Column 2.

5. Colour with black every third box of Column 3.

6. Colour with red every 4^{th} box of Column 4.

7. Colour with green every 5^{th} box of Column 5.

8. Colour with blue every 6^{th} box of Column 6.

9. Colour with orange every 7^{th} box of Column 7.

10. Colour with light green every 8^{th} box of Column 8.

11. Colour with purple every 9^{th} box of Column 9.

12. Colour with brown the 10^{th} box of Column 10.
(See Fig. 2)

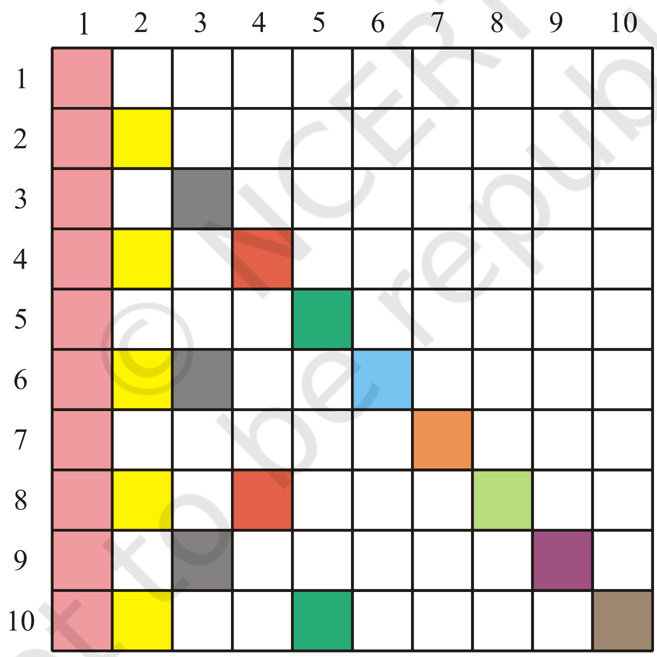


Fig. 2

Demonstration

1. To find the multiples of 1, look at the coloured boxes in the vertical column below 1. All the boxes along rows 1, 2, 3,... 10 are coloured. Mulitiples of 1 are 1, 2, 3,..

2. To find the multiples of 2 look at the coloured boxes in the vertical column below 2. The boxes along rows 2, 4, 6, 8, 10 are coloured. Multiples of 2 are 2, 4, 6, 8,...

   Similarly observe multiples of other numbers.

3. To find the factors of 1 look at the coloured box in the horizontal row for 1. Only the box below 1 is coloured. Factor of 1 is 1.

4. To find the factors of 2, locate the coloured boxes in the row for 2. The boxes below 1 and 2 are coloured. Factors of 2 are 1 and 2.

   Similarly observe factors of other numbers.

Observation

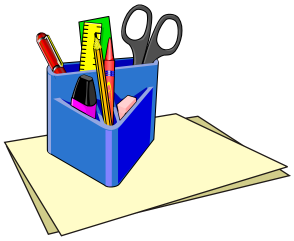
Complete the following table:

Numbers	Multiples	Factors
1	1, 2, 3, ..	1
2	—	—
3	—	—
4	—	—
5	—	—
6	6	1, 2, 3, 6
7	—	—
8	—	—
9	—	—
10	—	—

Application

1. This activity is useful in explaining multiples and factors of numbers.
2. This activity can also be used to explain the concept of prime number with the help of row having exactly two coloured squares.
3. This activity can be further extended to numbers upto 20.

Activity 20



Objective

To find the factors of a given number (say 18)

Material Required

Sufficient number of buttons, paper and pencil/ pen.

Method of Construction

Take 18 buttons and try to arrange them in rows in such a way that each row has the same number of buttons as shown below:

1. Arrange the buttons in one row as shown in Fig.1.

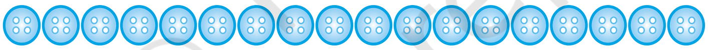


Fig. 1

2. Now, arrange the buttons in two rows as shown in Fig. 2.

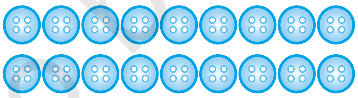


Fig. 2

3. Arrange the buttons in three rows as shown in Fig. 3.

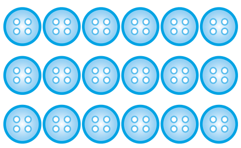


Fig. 3

4. Arrange the buttons in six rows as shown in Fig. 4.

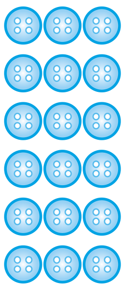


Fig. 4

5. Arrange the buttons in nine rows as shown in Fig. 5.
6. Arrange the buttons in eighteen rows (Fig. 6).

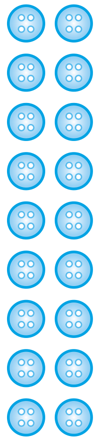


Fig.5



Fig.6

Demonstration

1. Arrangement of buttons in Fig.1 can be expressed as 18 = 1 × 18 (number of rows × number of columns)
2. Arrangement of buttons in Fig. 2 can be expressed as 18 = 2 × 9
3. Similarly from Fig. 3: 18 = 3 × 6
   Fig. 4: 18 = 6 × 3
   Fig. 5: 18 = 9 × 2
   Fig. 6: 18 = 18 × 1

   Thus, factors of 18 are 1, 2, 3, 6, 9, 18.

   Similarly, factors of other numbers say 20, 24, 28, etc. can be found.

Observation

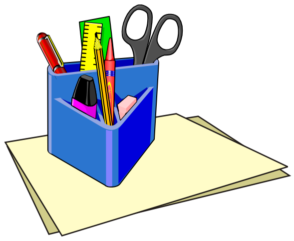
Complete the following table:

Number	Rows (R)	Columns (C)	(R × C)	Factors
18	1	18	1 × 18	—, —
	2	9	2 × 9	—, —
	3	6	3 × 6	—, —
20	1	20	— × —	—, —
	2	10	— × —	—, —
	....	....	— × —	—, —
24	—	—	— × —	—, —
	—	—	— × —	—, —
	....	....	— × —	—, —
28	—	—	— × —	—, —
	....	....	— × —	—, —

Application

This activity is useful in understanding the meaning of factors and multiples of a number.

Activity 21



Objective

To compare the lengths of palms of students

Material Required

Square grid papers, coloured pencil/pen, paper.

Method Of Construction

Make groups of 5 children, take a squared grid paper and place the palm of a child's on that gird paper and move the pencil around her palm.

Demonstration

1. When the child has placed her left hand palm, she will move the pencil/pen around her palm to trace the boundary.
2. Now count the number of squares enclosed in the boundary by taking half as half, more than half as 1 and leave the others i.e., less than half.
3. The other members of the group will record it in a table.

Observations

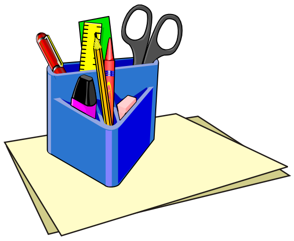
Child	Number of squares (more than half)	Number of squares (half)	Total of halves	Area in squares
1	70	20	10	70 + 10 = 10
2	–	–	–	–
3	–	–	–	–

Application

This activity can be extended in finding the areas of leaves and other objects.

13/04/18

Activity 22



Objective

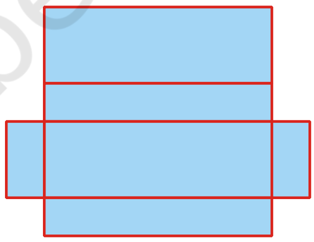
To make nets of cubes and cuboids using different objects

Material Required

Empty chalk box, sweet box, shoe box, pastry box etc., pen/pencil, scissor, cardboard, white paper, pens, cello-tape, glue

Method Of Construction

1. Take a cardboard of a convenient size and paste a white paper on it.
2. Open the folds of a box (say of pastry box) and flatten it out.
3. Put it on the cardboard and draw its boundary as well as lines along the folds as shown below:



Demonstration

1. Shape obtained is a net of a cuboid (pastry box).
2. If it is folded along the dotted line, a cuboid (box) is obtained.
3. It has 3 pairs of identical rectangles.

OBSERVATION

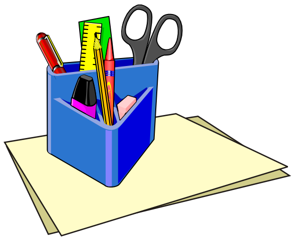
Complete the table:

S. No.	Box	Number of rectangles	Number of squares
1.	Pastry box	6	0
2.	Chalk box	—	—
3.	Sweet box	—	—
4.	Shoe box	—	—

APPLICATION

This activity is useful in explaining the idea of a net of 3-D shapes as well as their faces, edges and vertices. These nets are also useful in preparing different packing boxes.

Activity 23



Objective

To identify 2-D shapes in 3-D shapes

Material Required

Different objects such as a chalk box, bottle cap, bowl, match box, pencil box, pastry box etc. cardboard, glue, paper, pencil, eraser, white paper.

Method Of Construction

1. Take a cardboard and paste a white paper on it.
2. Take a 3D-object, say a chalk box and put it on the cardboard.
3. Trace the boundary of its face lying on the cardboard.

   Similarly, draw the boundaries of the other faces of the chalk box.
4. Repeat this process for other objects and draw the boundaries wherever possible.

Demonstration

1. Boundaries drawn on the cardboard for the given 3-D shape (chalk box) show various 2-D shapes.

Observation

Complete the table

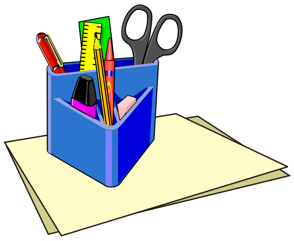
S. No.	Name of the object	2-D shape		
		Square	Rectangle	Circle
1.	Chalk box			
2.	Bottle cap			
3.	Bowl pencil			
4.	Box pastry			
5.	Box			
.	.			
.	.			
.	.			

Application

This activity will help the child in understanding different 3-D shapes.

Activity 24

[GAME]

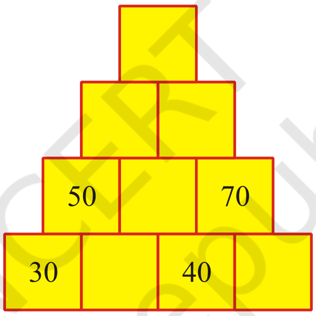


OBJECTIVE

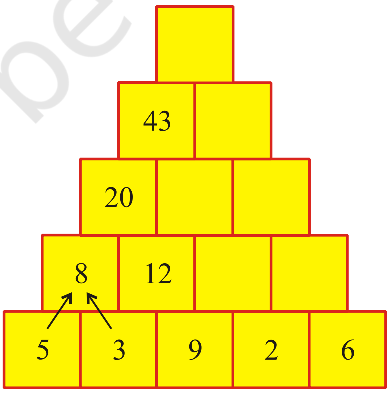
To complete the pyramids by observing the pattern.

METHOD OF CONSTRUCTION

1. Draw the pyramids as shown below:



2.

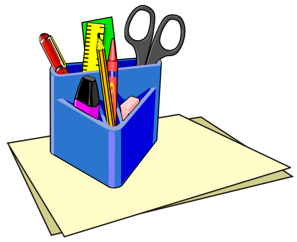


LET US PLAY

Fill in the empty boxes in the pyramids by observing the pattern shown.

Activity 25

[GAME]



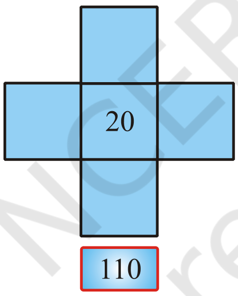
OBJECTIVE

To fill up the empty boxes

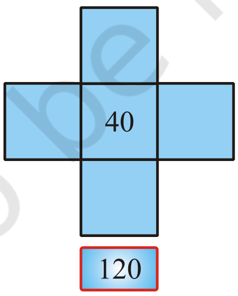
LET US PLAY

Write the numbers 20, 30, 40, 50 and 60 in the boxes, in such a way that the total of the numbers in each row and in each column is the number given below the box:

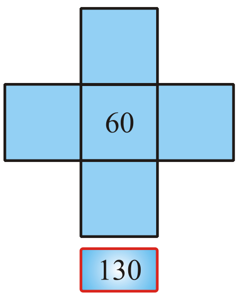
(i)



(ii)



(iii)

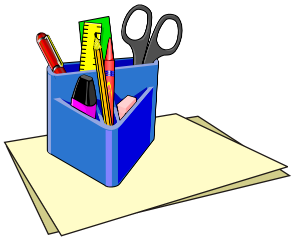


Write all the possible answers.

13/04/18

Activity 26

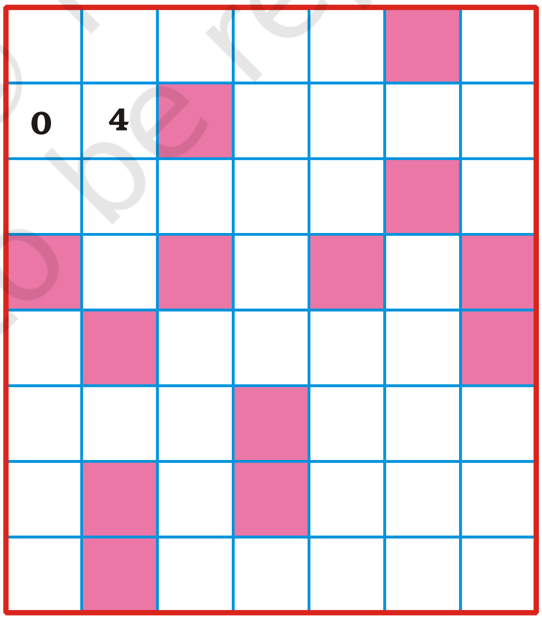
[PUZZLE]



A NUMBER PUZZLE

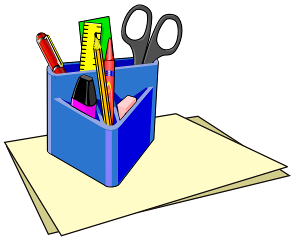
Fill all the numbers listed below in the grid:

602	2317	12446
105	2488	17629
172	6156	32042
400	8041	26141
431	8463	68314
546	8662	
569		



13/04/18

Activity 27



[Game]

A Cross Number Game

Fill in the boxes by working the problems given in 'Across' and 'Down'.

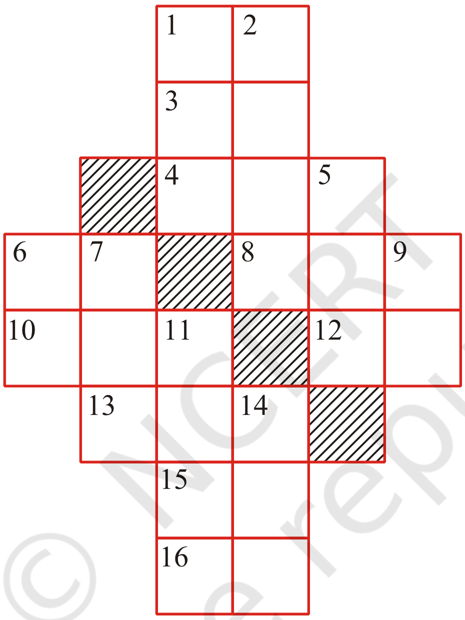


Fig. 1

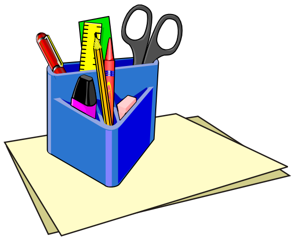
Across (row)

1. 28 + 54
3. 17 × 3
4. 655 – 398
6. 92 – 16
8. 234 × 4
10. 500 + 72
12. 18 × 3
13. 540 + 4
15. 300 – 215
16. 227 – 175

Down (column)

1. 332 + 520
2. 5000 – 2841
5. 147 × 5
6. 50 + 20 + 5
7. 500 + 100 + 75
9. 8 × 8
11. 2000 + 400 + 80 + 5
14. 700 – 248

Project



Some Shortcut Methods of Calculation

Students are familiar with operations on numbers such as addition, subtraction, multiplication and division. In many situations it becomes necessary to work out certain operations mentally. These mental operations are performed on the basis of certain short cuts. In this project an attempt has been made to mention some short cut methods of calculation.

When man invented numbers and methods of counting, he was fascinated with his new ideas. As time passed, man acquired more knowledge and as his life became more complex he started to search for ways to shorten the work of calculation. This led to the development of devices such as the abacus, logarithms, calculators and the computers.

Although man has shown such powers of invention, the need of 'calculation skills' cannot be eliminated. One cannot always carry a calculating device to check a grocery bill or bank statement. However, there are many ways of speeding up mental arithmetic. These short cuts amaze others with one's calculation powers besides saving time.

Objective

To understand and apply shortcut methods for calculations.

Description

1. **Multiplication of any number by 5:**

To multiply a number by 5, first divide the number by 2 and then multiply the quotient so obtained by 10. Or multiply the given number by 10 and divide the product so obtained by 2.

For example (a) 42×5

Step 1 : Divide the number by 2

$42 \div 2 = 21$

Step 2 : Multiply the quotient by 10

$21 \times 10 = 210$

So, $42 \times 5 = 210$

OR

Step 1 : Multiply the number by 10

$42 \times 10 = 420$

Step 2 : Divide the product by 2

$420 \div 2 = 210$

So, $42 \times 5 = 210$

(b) 67×5

Step 1 : $67 \times 10 = 670$

Step 2 : $670 \div 2 = 335$

So, $67 \times 5 = 335$

2. Multiplication of any number by 25:

Multiply the given number by 100 and then divide the product by 4.

For example (a) 16×25

Step 1 : Multiply the number by 100

$16 \times 100 = 1600$

Step 2 : Divide the product by 4

$1600 \div 4 = 400$

So, $16 \times 25 = 400$

(b) 81×25

Step 1 : $81 \times 100 = 8100$

Step 2 : $8100 \div 4 = 2025$

So, $81 \times 25 = 2025$

3. Dividing any number by 5:

Multiply the given number by 2 and divide the product by 10.

For example (a) $32 \div 5$

Step 1 : Multiply the number 32 by 2

$32 \times 2 = 64$

Step 2 : Divide the product by 10

$64 \div 10 = 6.4$

So, $32 \div 5 = 6.4$

(b) $121 \div 5$

Step 1 : $121 \times 2 = 242$

Step 2 : $242 \div 10 = 24.2$

So, $121 \div 5 = 24.2$

4. Dividing any number by 25:

Multiply the given number by 4 and divide the product so obtained by 100.

For example (a) $5 \div 25$

Step 1 : Multiply the number 5 by 4

$5 \times 4 = 20$

Step 2 : Divide the product 20 by 100

$20 \div 100 = 0.20$

So, $5 \div 25 = 0.20$

(b) $215 \div 25$

Step 1 : $215 \times 4 = 860$

Step 2 : $860 \div 100 = 8.6$

So, $215 \div 25 = 8.6$

13/04/18

5. Adding 9, 99, 999, … to any number:

For adding 9, add 10 to the given number and subtract 1 from the sum. For adding 99, add 100 to the given number and subtract 1 from the sum and so on.

For example (a) 2 + 9

Step 1 : Add 10 to the given number

2 + 10 = 12

Step 2 : Subtract 1 from the sum

12 –1 = 11

So, 2 + 9 = 11

(b) 18 + 99

Step 1 : 18 + 100 = 118

Step 2 : 118 – 1 = 117

So, 18 + 99 = 117

(c) 124 + 999

Step 1 : 124 + 1000 = 1124

Step 2 : 1124 – 1 = 1123

So, 124 + 999 = 1123

6. Multiplying any number by 9, 99, 999, …. .

For multiplying by 9 : Multiply the number by 10 and then subtract the number from the product.

For example (a) 8 × 9

Step 1 : Multiply the given number by 10

8 × 10 = 80

Step 2 : Subtract the number 8 from the product

80 – 8 = 72

So, $8 \times 9 = 72$

(b) 23×99

Step 1 : Multiply the number 23 by 100

$23 \times 100 = 2300$

Step 2 : Subtract the number 23 from the product

$2300 - 23 = 2277$

So, $23 \times 99 = 2277$

7. Subtracting 9, 99, 999, ... from the number:

For subtracting 9 : Add 1 to the number and then subtract 10 from the sum so obtained.

For subtracting 99 : Add 1 to the number and then subtract 100 from the sum so obtained.

For example (a) $24 - 9$

Step 1: Add 1 to the given number 24

$24 + 1 = 25$

Step 2 : Subtract 10 from the sum

$25 - 10 = 15$

So, $24 - 9 = 15$

(b) $256 - 99$

Step 1 : $256 + 1 = 257$

Step 2 : $257 - 100 = 157$

So, $256 - 99 = 157$

(c) $1457 - 999$

Step 1 : $1457 + 1 = 1458$

Step 2 : $1458 - 1000 = 458$

So, $1457 - 999 = 458$

8. Multiplying a number by itself with ones digit 5:

(a) Let the number be 135.

The number formed without ones digit = 13

Multiplying 13 and 13 + 1, we get 13 × 14 = 182

Product of ones digit: 5 × 5 = 25

So, 135 × 135 = 18225

(b) 45 × 45

The number formed without ones digit = 4

Multiply 4 and 4 + 1, i.e. 5, we get 4 × 5 = 20

Product of ones digit = 25

So, 45 × 45 = 2025

9. Multiplication of any number by 11:

To multiply a number by 11, first multiply that number by 10 and then add the same number to the product.

For example (a) 13 × 11

Step 1 : Multiply the number by 10

13 × 10 = 130

Step 2 : Add the same number to the product

130 + 13 = 143

So, 13 × 11 = 143

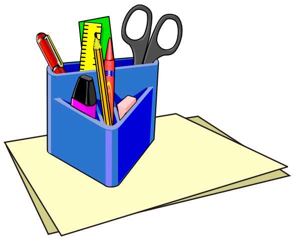
(b) 25 × 11

Step 1 : 25 × 10 = 250

Step 2 : 250 + 25 = 275

So, 25 × 11 = 275

Suggested List of Projects



1. Number patterns.
2. Numerals used presently in different languages.
3. About numerals used in ancient times.
4. Different ways of multiplying numbers (other than given in the textbook).
5. Collection of maps of some localities and to discuss important landmarks.
6. Making different shapes using pieces of tangrams.
7. Finding the day of the week corresponding to a given date (Calendar and its uses).

13/04/18